

Sudden Death Due to Atherosclerotic Heart Disease in the Very Young Adult

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San Antonio, TX and Washington, DC



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Introduction

- ◆ Sudden death in young adults is uncommon and frequently attributed to genetic conditions including hypertrophic cardiomyopathy or ion channel diseases.
- ◆ Sudden death due to coronary artery disease in those less than 30 years of age is not commonly reported as an etiology.

Eckart RE, et al. *Ann Intern Med* 2004;141:829-34
Maron BJ. *N Engl J Med* 2003;349:1064-75

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Study Design

- ◆ Review of non-traumatic sudden death within the Department of Defense with an available clinical record or autopsy for adjudication as to the cause of death.
- ◆ Sudden death - death or terminal life support within one hour of symptom onset.
- ◆ Cardiac death - pathologically confirmed heart disease with clinical circumstances defined as potentially cardiac in etiology or unexplained by pre-existing disease and without identifiable cause on post-mortem examination (idiopathic sudden death).
- ◆ Sponsored by the Air Force Medical Research Program (AF/SGRS).



Defining the Cohort

- ◆ 1,044 non-traumatic suspected cardiac deaths identified from 1998 to 2008.
 - ◆ Excluded 51 (5.1%) subjects for lack of clinical record or autopsy which allowed for determination of cause, 130 (12.5%) subjects for unavailability of records, and 12 (1.2%) subjects for what was determined to be a clear non-cardiac etiology.
- ◆ 902 subjects with records available for review in which adjudicated cause of death was of cardiac etiology that form the basis for the cohort under investigation.



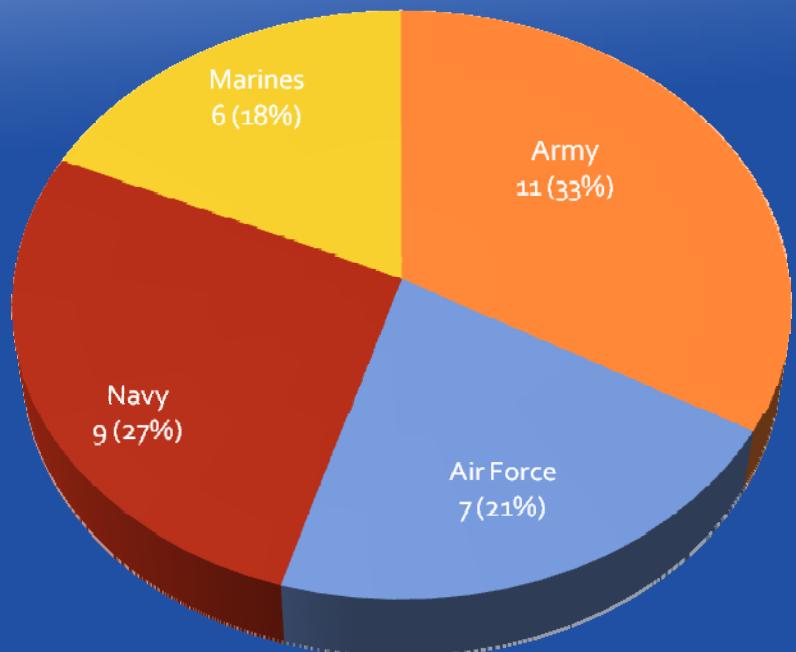
Results

| | Age <30 years n=218 | Age >30 years n=684 | p-value |
|---------------------------|------------------------|------------------------|---------|
| Age, years | 24±3 | 43±7 | <0.001 |
| Gender, % male | 205 (94.0%) | 666 (97.4%) | 0.030 |
| Idiopathic SCD | 101 (46.3%) | 86 (12.6%) | <0.001 |
| Cardiomyopathy | 65 (29.8%) | 109 (15.9%) | <0.001 |
| Coronary Disease | 51 (23.4%) | 484 (70.8%) | |
| Atherosclerotic disease | 33 (64.7%) | 478 (98.8%) | <0.001 |
| Anomalous coronary artery | 12 (23.5%) | 1 (0.2%) | |

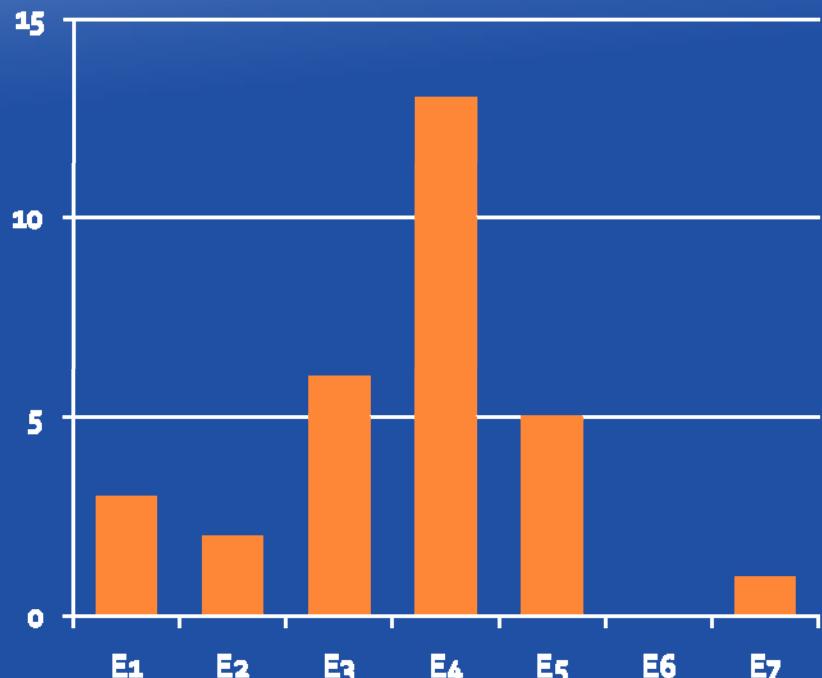
Baseline Characteristics

Military specific findings for those with death due to ASCAD <30 years of age

Branch



Pay Grade



Not shown is the 1 junior Officer



Similar clinical manifestations

| | Age <30 years n=33 | Age >30 years n=478 | p-value |
|------------------------------------|-----------------------|------------------------|---------|
| Body mass index, kg/m ² | 28±3 | 29±4 | 0.119 |
| Exertional death | 16 (48.5%) | 190 (39.8%) | 0.323 |
| Prodrome | 13 (39.4%) | 153 (32.0%) | 0.381 |
| Location of Death | | | |
| Out-of-hospital | 7 (21.2%) | 107 (22.4%) | 0.672 |
| Emergency Department | 15 (45.5%) | 249 (52.1%) | |
| In-hospital | 6 (18.2%) | 54 (11.3%) | |
| Antemortem symptoms | 3 (9.1%) | 58 (12.1%) | 0.602 |



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Differential expression of atherosclerotic disease

| | Age <30 years n=33 | Age >30 years n=478 | p-value |
|----------------------------------|-----------------------|------------------------|---------|
| Myocardial manifestation | | | |
| LV thickness, cm | 1.6±0.3 | 1.6±0.4 | 0.647 |
| Fibrosis | 7 (21.2%) | 149 (31.2%) | 0.314 |
| Necrosis | 2 (6.1%) | 48 (10.0%) | 0.658 |
| Coronary artery manifestation | | | |
| Multivessel obstructive disease* | 13 (56.5%) | 256 (77.1%) | 0.041 |
| Plaque rupture | 7 (21.2%) | 99 (20.7%) | 0.999 |
| Coronary thrombosis | 9 (27.3%) | 114 (23.9%) | 0.814 |
| Aortic atherosclerosis* | 6 (30.0%) | 160 (63.0%) | 0.008 |

*limited analysis to those cases where specified



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Context of Findings



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Conclusion

- ◆ Sudden death due to atherosclerotic coronary artery disease in those <30 years is much higher than previous series.
- ◆ Our differences may be due to this be an active surveillance, all with complete autopsies.
- ◆ Death due to atherosclerotic coronary artery disease in the young occurs frequently without a prodrome and is often non-exertional.



Sudden Death Due to Atherosclerotic Heart Disease in the Very Young Adult

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Similar clinical manifestations

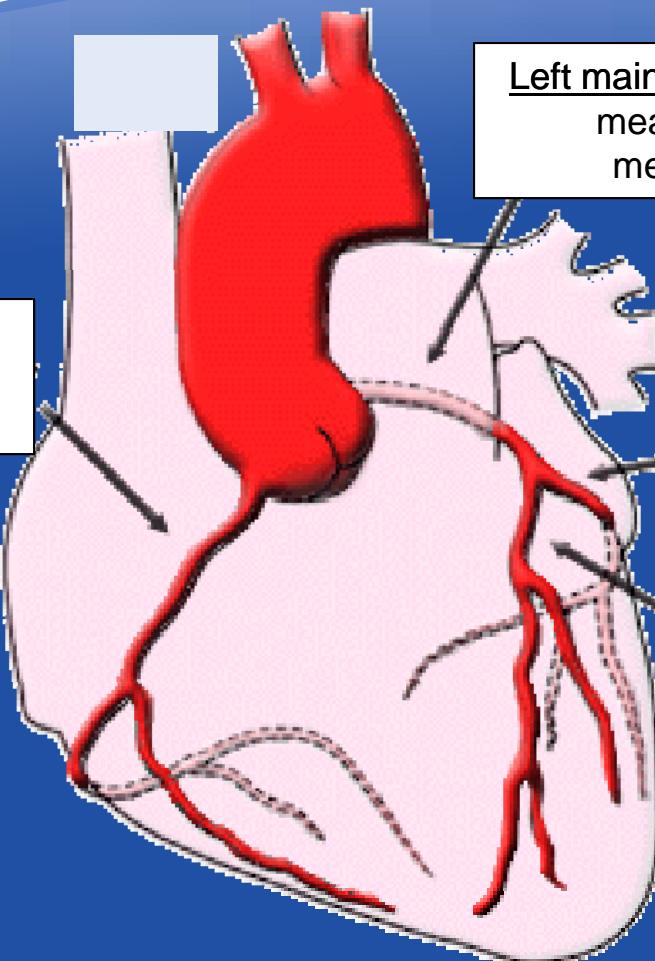
| | Atherosclerotic CAD n=33 | Idiopathic SCD n=101 | p-value |
|------------------------------------|-----------------------------|-------------------------|---------|
| Age, years | 24±3 | 24±3 | 0.253 |
| Body mass index, kg/m ² | 28±3 | 27±5 | 0.521 |
| Exertional death | 16 (48.5%) | 46(45.5%) | 0.926 |
| Prodrome | 13 (39.4%) | 34 (33.7%) | 0.697 |
| Location of Death | | | |
| Out-of-hospital | 7 (21.2%) | 23 (22.4%) | 0.138 |
| Emergency Department | 15 (45.5%) | 60(52.1%) | |
| In-hospital | 6 (18.2%) | 5 (11.3%) | |
| Antemortem symptoms | 3 (9.1%) | 11 (10.9%) | 0.999 |



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Differential expression of disease



Right coronary artery
mean $62\pm25\%$
median 60%

Left main coronary artery
mean $61\pm29\%$
median 68%

Circumflex coronary artery
mean $39\pm19\%$
median 50%

Left anterior descending coronary artery
mean $75\pm20\%$
median 80%